A SPATIAL DESCRIPTION OF AN ELEMENTARY ERUPTIVE PHENOMENON (EEP)

M.J. Martres, Z. Mouradian, I. Soru-Escaut
Observatoire de Paris-Meudon

1. Introduction

Classically, a flare is considered to be a sudden increase of the brightness in the chromospheric lines. An attentive study of this phenomenon shows that the brightness increase is associated with various absorbing features (HIEI, 1980). Therefore, we consider that the bright flare is only one aspect of the eruptive process. The complete eruptive phenomenon is the comprehensive transitory feature formed by absorbing and emitting structures, evolving in space and time and associated with the same physical origin. In addition, a complete eruptive phenomenon includes a set of elementary eruptions, so the study of an elementary eruptive phenomenon is important to the understanding of a complex phenomenon. Although the entire eruptive phenomenon includes manifestations in other wavelengths, only EUV and "visible" aspects are considered here.

2. Observational data

Studies were made of the subflare of 1973, June 16 at 18:03 observed on the disk (N 14 - E 13). The data used were :

a) the Meudon H_α filtergrams which give line center images every minute as well as the blue and red wings ($\pm$ 3/4 Å) and

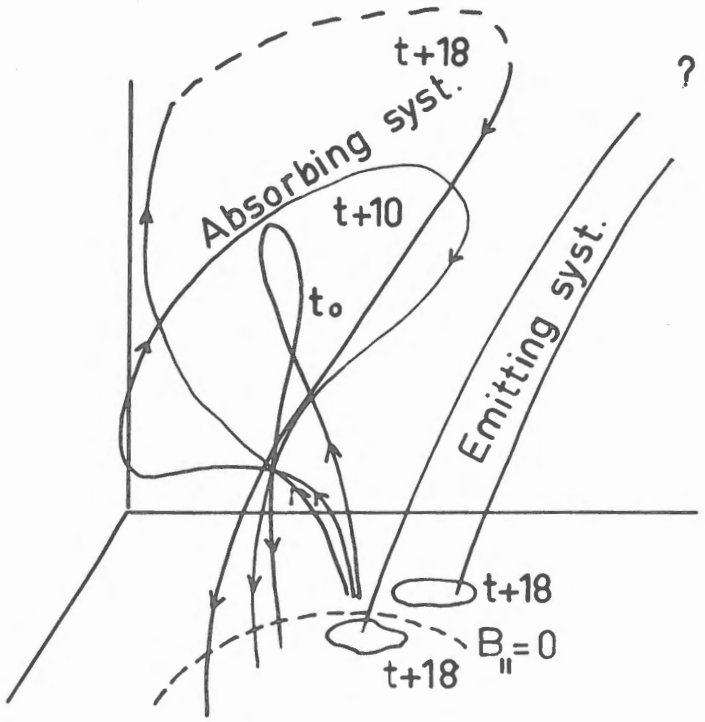
b) the EUV spectroheliograms of the Harvard College Observatory in Ne VII (464 Å), Fe XV (417 Å) and Fe XVI (335 Å). These lines have respectively the maximum of abundances at 5.10^5 °K, 2.10^6 °K and 3.10^6 °K.

3. History of the EEP

- t_o : The eruptive instability begins near the region where the flare will start. This instability appears as absorbing arches with radial velocities in both wings of H_α and develops until the end of the flaring phase. It reaches the altitude of $1.5\ 10^4$ km at 18:03 U.T.

- t_o+10 m : Nothing is yet visible in Fe XVI. Note that the H_α flare is not yet initiated, but the H_α mentioned above continues to evolve.

- t_o+18^m : The onset of the bright points (flare) is observed. At this moment great changes occur in the arch : expansion at the top (Tanaka, 1976) and displacement of one of the legs. The direction of the flow of the absorbing material is unchanged.



- t_o+37^m : The absorbing and emitting structures in H_α continue to evolve and expand. EUV observations show :

. an emission cospatially with H_α emission, but larger ;

. a dark feature cospatially with H_α absorption, but narrower.

The figure describes the geometrical aspect of the arch system (absorbing and emitting) of this EEP.

An ambiguity remains concerning the "switch off" of the hot arch system.

4. Elements of a model

i) The emission at 10^{6}°K is cospatial with the H_α emission and is not directly connected with the absorption phenomenon which starts first.

ii) At the onset of the H_α bright points, which are the footpoints of the hot arch system, the cool arch expands in altitude and its footpoints are removed.

iii) Consequently, the EEP would be considered by two systems of arches : a cool one visible in H_α on the disk as an absorbing feature and an emitting feature in H_α as well as in EUV lines (Ne VII, Fe XV, Fe XVI).

iv) A flow of matter is observed in the cool system, moving from one foot to the other and always in the same direction.

The hot system probably does not have such motions and if there are any, they must be $\leq$ 5 km.s^{-1}.

REFERENCES

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